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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,465	07/18/2003	Hiroyoshi Funato	R2184.0056/P056-B	1137

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2101 L STREET NW
WASHINGTON, DC 20037-1526

EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 04/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/621,465	FUNATO, HIROYOSHI	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on July 18, and August 19, 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's preliminary amendments filed on July 18, 2003 and August 19, 2003, both have been entered in the file.
- By these amendments, the applicant has canceled claims 1-29 and has newly added claims 30-47.
- Claims 30-47 remain pending in this application.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the features concerning the applying an organic polymer material on a substrate and the drying and stretching recited in claim 30 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. **The applicant is respectfully reminded that there are no Figures 19A to 20C submitted in the application.**

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 30-47 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.** The claim(s) contains subject matter which was not described in the

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specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification and the claims fail to teach what is considered to be a “polarization hologram” as recited in the claims. It is not clear if the hologram will polarize light (i.e. creating a resultant light with a single polarization state) as it enters the hologram or if it will effect polarized light. The hologram seems to be wavelength selective yet no disclosure of the claims supports the hologram being “polarization”, to give definite meaning to the term.

Claims 31-42 and 44-47 inherit the rejection from their respective based claim.

4. **Claims 30-42 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to teach that the birefringence layer is provided on the same substrate as the substrate used to apply the organic polymer material. The polymer layer has already been removed from the substrate. The specification also fails to teach how could the polarization hologram diffracts a “reflection beam”.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. **Claims 30-47 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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The phrase “an incident reflection beam” recited in claims 33, 44 and 47 are simply wrong since there is no such thing as an *incident reflection* beam. If a light beam is incident upon a medium that is to say it propagates **toward** the medium it then cannot be a reflection beam which propagates **away** from the medium.

Claim 32 is indefinite since the alternative phrase “selected from among” is not clearly defining a Markush group, to make the scope the claim definite.

The phrase “an incident reflection light” recited in claims 44 and 47 is confusing and indefinite since it is not clear how does it relate to the “reflection light” recited in their based claim 43.

7. **Claims 30-42 are rejected under 35 U.S.C. 112, second paragraph**, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the **steps of forming the periodic grating pattern on a birefringence film** by using a photomask in a lithographic process. It is impossible for the birefringence layer being “provided on a substrate” in a “periodic grating pattern” without any method steps such as lithographic process using mask or beam interference method using interfering light beams, to form the periodic grating pattern. Claims 31-42 inherit the rejection from their based claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 30-33, 35-42 and 43-45, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Takeda et al (PN. 5,739,952) in view of the patent issued to Yoshimi et al (PN. 5,245,456).

Takeda et al teaches a *polarization beam splitter* that is comprised of a *holographic grating pattern* (Figures 1-3) formed with *birefringence film* (2) laying on a *substrate* (1). The birefringence layer (2) has an anisotropic property such that the *refractive indices* (n_o and n_e) of the layer for light propagates in the *ordinary* direction (S-polarization direction) and *extraordinary* direction (P-polarization direction) are different from each other. This difference in refractive indices will make the holographic grating imparting different phase value to the S-polarization and P-polarization components of an incident light which therefore will diffract the two components of light differently.

Takeda et al teaches that the holographic grating pattern of the polarization beam splitter is formed by first *depositing* a monomeric diacetylene film on a *substrate* and then polymerized it to form a polymer of diacetylene, which is an *organic polymer material*. The polymer material is then *rubbed* in *one direction to form the birefringence layer*. Takeda et al further teaches that a resist for forming a grating is applied on top of the polydiacetylene film to form the grating pattern in the film, (please see columns 8-9). The grating pattern is holographic because Takeda et al teaches explicitly that the grating may also be formed by two-beam interference method, (please see column 9, lines 1-5).

This reference has met all the limitations of the claims with the exception that although it teaches that polymer film is *rubbed* in one direction but it does not teach explicitly that the polymer film is stretched and heated to form the birefringence film. However using stretching and heating process to form birefringence film from an organic polymer film is rather well known in the art as demonstrated by the teachings of Yoshimi et al wherein polymer film is **heat stretched** to have its molecules oriented in a particular direction, (please see the abstract). Yoshimi et al teaches that polymer materials that can be made birefringent by heat stretching method include polycarbonates and polystyrene. It would then have

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been obvious to one skilled in the art to use the well-known heat stretching method and the well known polymer materials as an alternative arrangement for making the birefringence film and therefore the holographic grating for the benefit of providing different and a plurality of designs and arrangements for making the holographic grating of the polarization beam splitter as desired. Although these references do not teach explicitly that the organic polymer film is applied on a substrate and then removed from the substrate however such process may have been inherently met by the disclosure of Takeda et al in the step of first depositing the monomer on the substrate and to polymerized it. And it is also implicitly included in the teachings of Yoshimi et al as this reference explicitly teaches that the polymer film (such as a polycarbonate film) is laminated on one side of a stretched film to allow the polycarbonate film be heat stretched, (please see column 6, lines 53-61). This suggests that the polycarbonate film has to first be removed from certain substrate used to form the polymer. Such features therefore are either inherently met by the disclosures or an obvious modification to one skilled in the art to form the ready to use polymer film before stretching process.

With regard to claims 31 and 44, in a different embodiment Takeda et al teaches that an isotropic layer (20, Figure 12) can be formed over the grating patterned birefringence film (2) to enclose the birefringence layer.

With regard to claims 32-33, Yoshimi et al reference teaches that the suitable polymers that can be heat stretched to from birefringence film includes polycarbonate, polystyrene and polyimide film, (please column 3, lines 49-64). The modification would have been obvious to one skilled in the art since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended used as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regard to claim 35, Yoshimi et al teaches that the heat stretching process is done at a temperature between 100 to 160 °C. Although it does not teach explicitly that it is heated at 350 °C but

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such feature is considered to be obvious modification since at either temperature the same result namely forming the birefringence film out of the polymer film is achieved.

With regard to claims 37-39, these references teach many different examples of birefringence film with different refractive index in the ordinary and extraordinary direction, however they do not teach explicitly to have the particular values claimed in the claims. But such modification is considered to be obvious matters of design choices to one skilled in the art to make the birefringence film with desired refractive indices so that the polarization beam splitter with the holographic grating pattern will behave as desired.

With regard to claims 40 and 41, Takeda et al teaches that the optical path difference for the ordinary and extraordinary light paths for the grating patterned birefringence film with the grooves of the grating pattern formed with isotropic material are denoted by equations 26 and 28, i.e.

$$\text{OPD (o)} = (n_o - n_c) * d_2 * k, \quad \text{OPD(e)} = (n_e - n_c) * d_2 * k,$$

Wherein n_o and n_e are the refractive indices of the birefringence film for the ordinary and extraordinary direction and n_c is the refractive index of the isotropic layer and d_2 is the grating height and k is $\lambda/2\pi$, λ being the wavelength. Takeda et al teaches that in order for the ordinary light or the extraordinary light to be not diffracted by the grating the optical path length difference has to be an even multiple of π , i.e. $2m\pi$, and in order for them to be diffracted the optical path difference has to be an odd multiple of π , i.e. $(2m+1)\pi$. Takeda et al teaches that the beam splitter including the holographic grating is designed to totally diffract one component of the beam and leaves the other not diffracted, (please see column 7, lines 18-24). This then requires one of the optical path difference equals $2m\pi$ and the other equals $(2m+1)\pi$. This then gives the following results:

$$\text{OPD(o)} = 2m\pi = (n_o - n_c) * d_2 * k, \text{ which gives } (n_o - n_c) d_2 = m \lambda, \text{ and}$$

$$\text{OPD (e)} = (2m+1)\pi = (n_e - n_c) * d_2 * k, \text{ which gives } (n_e - n_c) * d_2 = (2m+1) \lambda,$$

Or,

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$$\text{OPD(o)} = (2m+1)\pi = (n_o - n_e) * d_2 * k, \text{ which gives } (n_o - n_e) d_2 = (2m+1) \lambda, \text{ and}$$

$$\text{OPD (e)} = 2m\pi = (n_e - n_o) * d_2 * k, \text{ which gives } (n_e - n_o) * d_2 = m \lambda.$$

With regard to claim 42, these references do not teach explicitly to use spin coating for applying the organic polymer to the substrate, however such process is extremely well known in the art, such modification would have been obvious to one skilled in the art as an alternative means to apply the polymeric film on the substrate.

With regard to claim 45, Takeda et al teaches that the thickness of the birefringence layer may be greater than the grating height as shown in Figure 4. Although it does not teach explicitly to have the isotropic layer overlaid the birefringence layer, such modification would have been obvious as indicated by the disclosure of Figure 12 for the benefit of protecting the holographic grating from damages.

10. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Takeda et al and Yoshimi et al as applied to claim 30 above, and further in view of the patent issued to Yamamoto et al (PN. 6,040,418).

The polarization beam splitter comprises a holographic grating taught by Takeda et al in combined with the teachings of Yoshimi et al as described for claim 30 above have met all the limitations of the claims. These references do not teach explicitly to process the polyimide film with the claimed acid and solvent solution. However such process is standard in the art as taught by Yamamoto et al wherein the polyimides is prepared with polyamide acid with solvent, (please see columns 1 and 2). It would then have been obvious to one skilled in the art to use the method for preparing the polyimide film as desired.

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11. Claims 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Takeda et al and Yoshimi et al as applied to claim 43 above, and further in view of the patent issue to Iwatsuka et al (PN. 5,245,471).

The polarization beam splitter including the holographic grating taught by Takeda et al in combination with the teachings of Yoshimi et al as described for claim 43 above have met all the limitations of the claims. These references however do not teach to have the features of having a second substrate formed with an adhesive layer as the isotropic layer. Iwatsuka et al in the same field of endeavor teaches a polarizer including grating pattern formed in birefringence layer wherein a second substrate (19, Figure 6E) is formed on top of an adhesive layer (18) serves as the isotropic layer that fills the grooves of the grating patterned birefringence layer (4). It would then have been obvious to one skilled in the art to apply the teachings of Iwatsuka et al to modify the design of the beam splitter of Takeda et al accordingly for the benefit of providing the polarization beam splitter with easy handling.

Double Patenting

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13. Claims 30-47 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,618,344. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both

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claimed a polarization hologram with grating pattern formed in a birefringence layer such that the birefringence layer is a heat stretched organic polymer material.

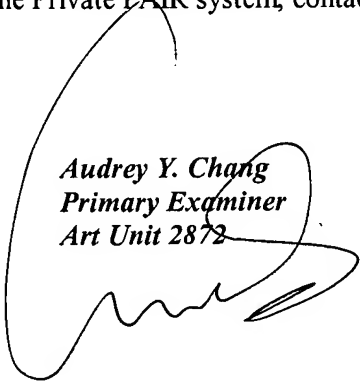
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.